Vehicle Designs and Advanced Technologies:
Keeping Older Adults Safely Driving

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Populations are Aging Globally

- **The world's population is older now than in any time in history.**

- **Projections from the United Nations show:**

  - **Global proportion of people age 60 and older was 8% in 1950, 11% in 2009, and is expected to be 22% in 2050.**

  - **These proportions are even greater for more developed countries where by 2050 one-third of each country's population is expected to be age 60 or older.**

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Populations are Aging Globally

Country	% Country Population Age 60 and Older	World Ranking (Out of 196)
Japan	29.7	1
Sweden	24.7	4
France	22.7	14
Canada	19.5	30
Australia	19.1	33
United States	17.9	43
China	11.9	65
Brazil	9.9	79
India	7.4	105
Qatar	1.9	196

United Nations, 2009

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Driving is Likely to Remain the Primary Mode of Travel for Older Adults

- **Older adults prefer to maintain mobility through the use of a personal vehicle.**

  - **This will likely be the case for the next generation of older drivers.**

- **Most older adults currently travel by car either as a driver OR passenger.**

  - **A recent Michigan study* found that 99 percent of older adults most often rely on driving or riding as a passenger to get around.**

* Eby, et al., 2011

Driving is Likely to Remain the Primary Mode of Travel for Older Adults

- **Older people are holding licenses longer and driving more miles than previous cohorts.**
  - **US Men/Women age 65+: 90%; 80%**
  - **Adults age 70+ in Sweden with a driver's license increased from about 28% in 1983 to about 72% in 2008***
- **Lack of effective and acceptable non-driving alternatives in most jurisdictions.**

*Sivak & Schoettle, 2011

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Functional Declines in Older Adults

- **As people they are more likely to have medical conditions (and take medications) that can compromise driving safety:**
  - **Visual Abilities**
  - **Cognitive Abilities**
  - **Psychomotor Abilities**
- **Fragility: increasing inability to withstand disease or injury.**
- **Frailty: ability to recover from a disease or injury.**

Crash Risk Increases In Older Adulthood in US

US Driver Fatality Rates, 2008
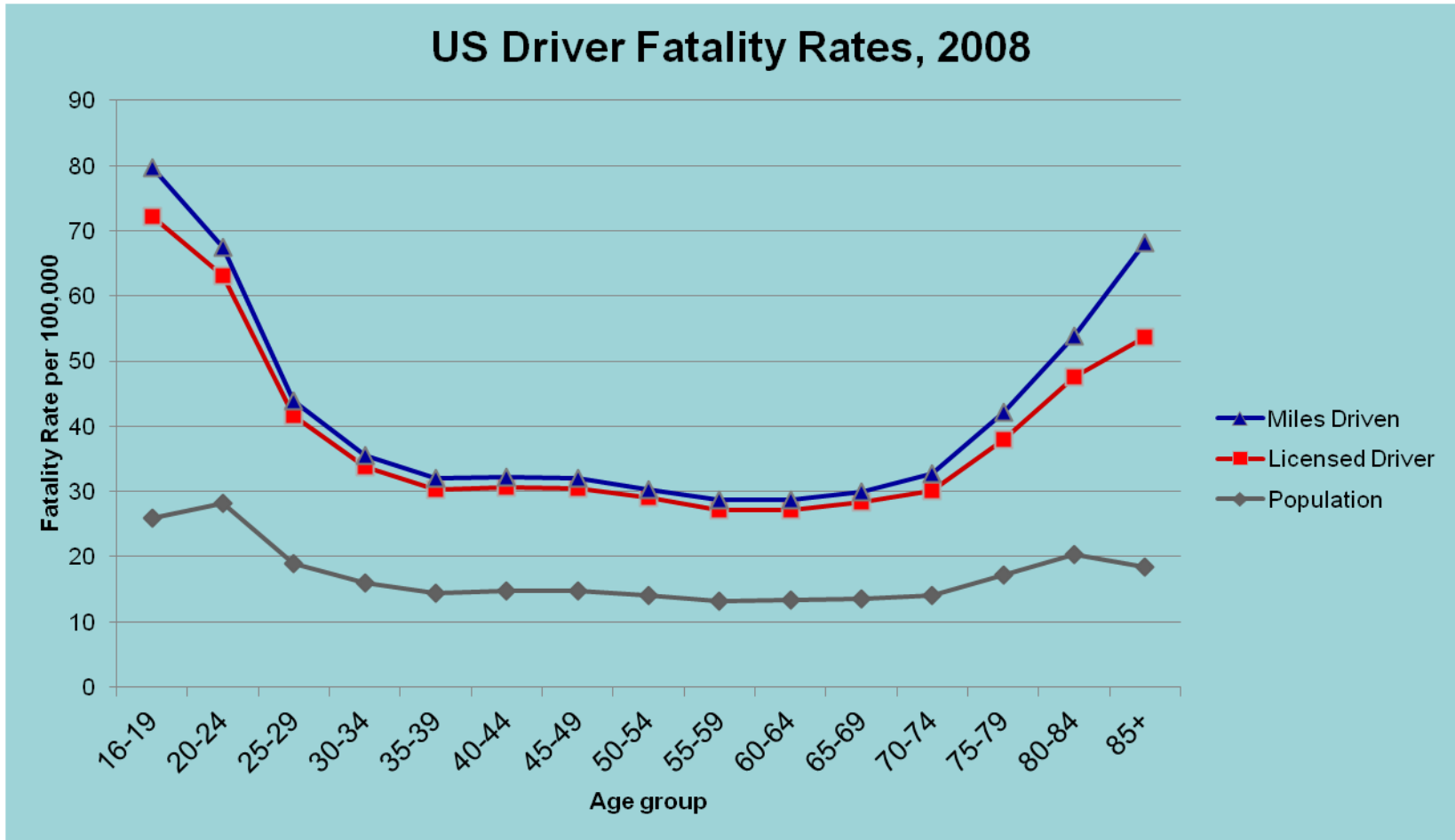
Insurance Institute for Highway Safety, 2007; FHWA 2008

Possible Global Market for Vehicles Designed for Older Adults

- Vehicles could be designed to take into account and even help overcome some of the deficits in abilities common in older people.

- Advanced in-vehicle technologies could also help.

- Crashworthiness is important.

Vehicle Design and Advanced Technologies

- **Categories of vehicle design that are most relevant for older adults:**
  - **Ingress/Egress**
  - **Seating**
  - **Visibility**
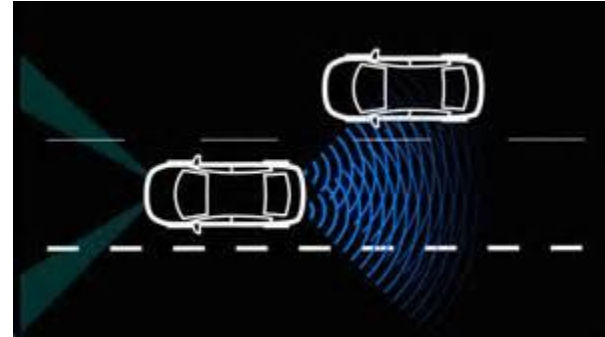 - **Cargo Areas**
  - **Dashboard Controls**

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- **Advanced technologies that could provide greatest benefit to older adults:**

  - **Lane departure warnings**
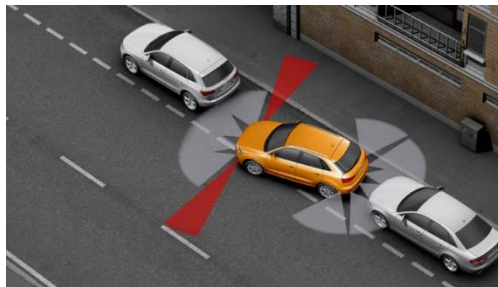

  - **Forward collision warnings**
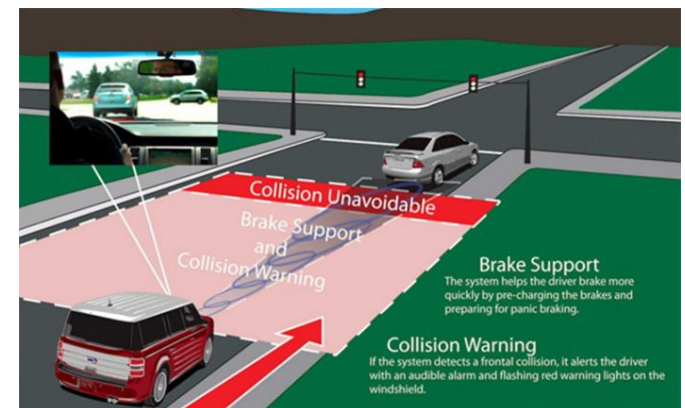
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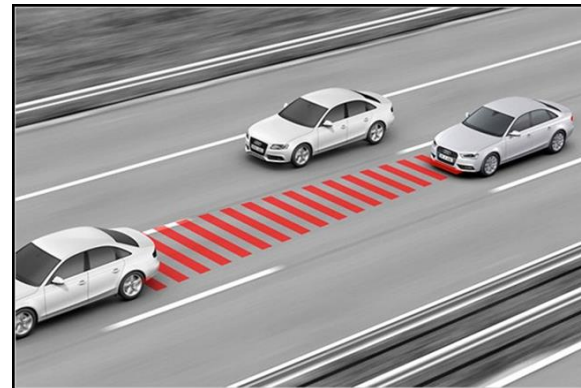
- **Blind spot warnings**
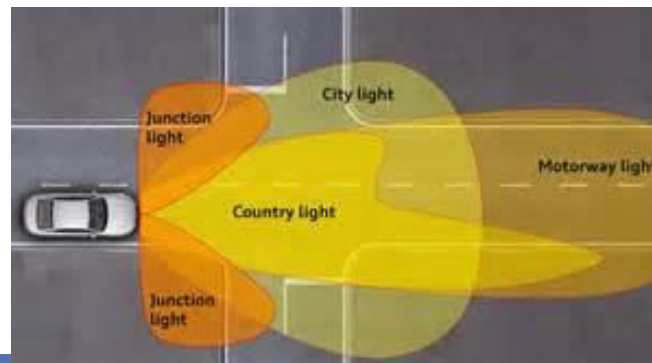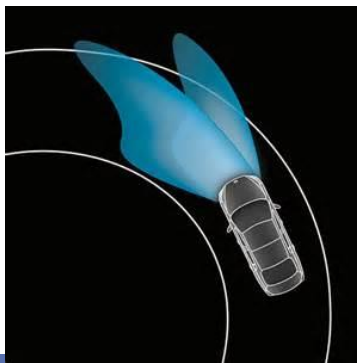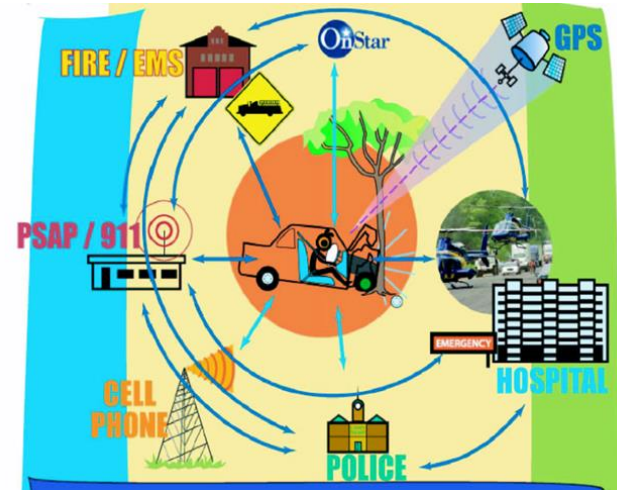

- **Parking assist systems**

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- **Navigation assistance**

- **Adaptive cruise control**

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- **Automatic crash notification**

- **Adaptive headlight systems**

Crashworthiness

- **Encompasses various vehicle features intended to provide crash protection to occupants.**

- **Older vehicle occupants present unique challenges for improving crashworthiness:**

  - **Increased fragility and frailty relative to younger people**
  - **Different types of crashes (e.g., intersection and multiple vehicle)**
  - **Increased susceptibility to injury in crashes**
  - **Differences in patterns of injury – risk of chest injury increases with age**

Crashworthiness

- **Advances in crashworthiness:**
  - **Improvements in structural design (e.g., added head impact protection in frontal crashes)**
  - **Increased acceptability of belt systems as a result of improved ease of use, fit, comfort**
  - **More protective seat belt designs (e.g., 4-point belts, inflatable belts)**
  - **Other belt system advancements (belt force limiters, pretensioners, dynamic optimization, identification technologies, integrated seat belt systems, height adjustors, reminder systems)**
  - **Airbag sensors and side airbags**

Discussion

- **Opportunity exists to improve safety, mobility, quality of life by designing vehicles and vehicle technologies to help overcome age-related declines.**

- **Training and education need to be improved.**

- **Technologies need to be designed with a full understanding of how they will be used by older adults.**

- **Aging trends point to large market of older adults interested in buying vehicles to extend safe driving.**

- **Marketing of these vehicles will be challenging.**